Running Head: IMPULSIVITY AND PSYCHOPATHY IN ADOLESCENTS

Impulsivity and Psychopathy in Adolescent Smokers and Nonsmokers

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements for Graduation *with Research Distinction* in the Undergraduate Colleges of The Ohio State University

By

Shane Melanko

The Ohio State University

February, 2008

Project Advisor: Dr. Brady Reynolds, Departments of Pediatrics and Psychology

Table of Contents:

This project is dedicated to two groups of individuals:

First, it is dedicated to the professors and researchers who were willing to open the door to give me this opportunity. Without you all, this project would never have been possible. I hope that I have made you all proud and that you will continue to provide these opportunities and advantages to future students like myself.

Second, this project is dedicated to the professors and researchers who closed those same doors of opportunity and denied me this chance. Without your indifference to me and your disbelief my abilities, I would have never found myself on this path and as such, this project would never have been possible.

Acknowledgements

I would first and foremost like to thank Dr. Brady Reynolds for the help, time, and encouragement he provided me from the start of this project. There is no doubt in my mind that you played an integral role in directing me towards a future career in research in psychology. Prior to beginning work in your lab, I was very much ready to quit on research entirely but my positive experience in your lab was more than enough to overcome all of my past negative research encounters. I will never be able to express how appreciative I am of your wisdom, support, career advice, and friendship.

I am also extremely thankful for the efforts of my coworkers and for the friendships that were fostered by working in the Reynolds lab. The efforts of the last 20 months would not have been possible without the aid of Kristen, Christine, Michele, and Palak. I wish you all the best of luck in whatever directions you may find yourselves down the road.

If there is **ever** anything that I can do for any of you, no matter how insignificant the problem may be, I hope that you will not hesitate to call on me. You can be sure that I will answer.

This research was generously supported by the Department of Arts and Sciences Summer Research Internship (2007) and by the Social and Behavioral Sciences Spring and Autumn Research Grants.

Shane Evert Melanko

Curriculum Vitae

Current Position: Research Assistant

Work Address: Columbus Children's Research Institute
Department of Pediatrics
The Ohio State University
700 Children's Drive, W103
Columbus, OH 43205

Home Address: 88 West Norwich Avenue., Apartment E.,
Columbus, Ohio, 43201

Telephone: w: (614).355.3601 c: (740).359.9834

E-mail Address: Melanko.3@osu.edu

Education ……...… BS Psychology, BA Criminology, June 2008
The Ohio State University

Publications

Reynolds, B., Patak, M.**,** Shroff, P., Penforld, R., **Melanko, S**., & Duhig, A.M. (June 2007). Laboratory and self-report assessments of impulsive behavior in sdolescent daily smokers and nonsmokers. *Experimental and Clinical Psychopharmacology,* 15(3), 264-271.

Presentations

Reynolds, B., Leraas, K., Shroff, P., Patak, M**., Melanko, S**. (2007, April). *Adolescent Smokers Rate Delayed Rewards as Less Certain than Adolescent Nonsmokers.* Poster presented at the annual Columbus Children's Research Institute Research Retreat.

Patak, M**.,** Shroff, P., **Melanko, S**., Leraas, K., Reynolds, B. (2007, April). *Delay Discounting is Related to Treatment Outcomes For Adolescent Cigarette Smoking.* Poster presented at the annual Columbus Children's Research Institute Research Retreat.

Patak, M., Shroff, P., **Melanko, S**., Leraas, K., & Reynolds, B. (2007, June). *Delay Discounting is Related to Treatment Outcomes For Adolescent Cigarette Smoking.* Poster presented at the 69th annual meeting of The College on Problems of Drug Dependence.

Reynolds, B., Leraas, K., Shroff, P., Patak, M**., Melanko, S**. (2007, June). *Adolescent Smokers Rate Delayed Rewards as Less Certain than Adolescent Nonsmokers.* Poster presented at the 69th annual meeting of The College on Problems of Drug Dependence, Quebec City, Canada.

Abstract

Little research has explored the relationship between characteristics of psychopathy and assessments of impulsive behavior using laboratory behavioral measures. The current study examined impulsive decision-making (delay discounting, DD) and disinhibition in relation to ratings of psychopathy in a sample of adolescent smokers (n = 30) and nonsmokers (n = 15). Smokers and nonsmokers did not differ significantly in ratings of psychopathy or on the measure of disinhibition. However, smokers and nonsmokers did differ significantly on the measure of DD, with smokers discounting more impulsively than the nonsmokers. For a second set of analyses, smokers were subdivided into high and low psychopathy groups (n = 15 each) based on a median split. These groups were compared against each other and the nonsmokers. The three groups did not differ on the measure of disinhibition. For the measure of DD, the low psychopathy smokers and nonsmokers still differed as described above for smokers and nonsmokers; however, the high psychopathy smokers did not differ from the nonsmokers. Also, there was a negative correlation between the measures of DD and psychopathy, indicating that participants with higher psychopathy ratings on average discounted less (i.e., performed less impulsively) than participants with lower ratings. These findings indicate that being high in characteristics of psychopathy (e.g., grandiosity or callousness) reduces, or offsets, the relationship between DD and smoking status among adolescents. These findings may shed light on specific behavioral characteristics (i.e., psychopathy) that influence the relationship between delay discounting and cigarette smoking status.

Impulsivity and Psychopathy in Adolescent Smokers and Nonsmokers

In contemporary times, the concept of psychopathy has received increasing attention. The media reports many shocking cases of extreme violence and cruelty. Social science researchers have tried to identify psychopathic traits, and one characteristic that stands out is the construct of impulsivity. Impulsive behavior may represent the hallmark behavioral characteristic of psychopathy (American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders; 4th ed. text revision*). Substance use disorders frequently co-occur with psychopathy, perhaps because of characteristics shared between these conditions such as low self-discipline, inabilities to control one's behavior, or weak executive functions (Loney, Taylor, Butler, and Iacono, 2007).

The overall goal of this project was to explore relations between different dimensions of impulsivity and ratings of psychopathy in adolescent cigarette smokers and nonsmokers. To date, there has been a lack of research concerning psychopathy and impulsivity in adolescent populations. We expected that there would be an association between measures of impulsivity and ratings of psychopathy. We also anticipated that adolescents who smoked cigarettes would have higher ratings of psychopathy than adolescents who did not smoke. Such findings would parallel a finding from similar research with adults (Petry, 2002).

Impulsivity

Impulsivity is a complex and multidimensional concept that is assessed through the use of both self-report questionnaires and laboratory-behavioral tasks (e.g. Reynolds, Ortengren, Richards, & de Wit, 2006). One of the distinctions between self-report and

laboratory-behavioral assessments is the fact that each examines impulsivity at different levels of specificity. Self-reports are the most commonly reported assessments of impulsivity, and they provide a more general characterization of behavioral styles (e.g. Reynolds, Patak, Schroff, Penfold, Melanko, & Duhig, 2007). These measures provide broad behavioral characteristics because they were designed to assess impulsivity as a set of general tendencies that have multiple factors that ultimately characterize a behavior as impulsive (Patton, Stanford, & Barratt, 1995). Some of these general tendencies may include traits like attention, self-restraint, perseverance, or mental stability. Some self-reports have been developed for adolescent populations, and these versions have been found to be comparable with adult assessments (e.g. Fossati, Barratt, Acuarini, & Di Cegelie, 2002).

Whereas self-reports assess broad dimensions of impulsivity, laboratory-behavioral tasks examine more specific behaviors of interest. Laboratory-behavioral measures do not correlate well with self-report measures, and this may be the result of their examination of more specific behaviors (Reynolds et al, 2006). Related to impulsivity, these measures differ from self-reports in that they assess the actual behavior of interest. Laboratory-behavioral measures do not rely on the participant to accurately evaluate and disclose his or her own behavior. Therefore, these measures may provide more objective assessments of impulsivity (e.g. Dougherty, Mathias, Marsh, & Jagar, 2005).

Recent evidence indicates there are at least two types of impulsive behavior assessed with laboratory behavioral tasks: impulsive disinhibition and impulsive decision-making (Reynolds et al, 2006). Behavioral disinhibition is a model of impulsive

behavior involving the ability to hold back from performing certain behaviors (Logan, 1994). For laboratory assessments, disinhibition is typically assessed with computerized reaction-time tasks that require subjects to initiate and then to hold back responses to certain images or sounds (Dougherty et al, 2003). These evaluations measure the participant's capacity to restrain undesirable behaviors and responses. For instance, adult cocaine users were shown to have poor inhibition abilities compared to adults who did not use cocaine (Fillmore & Rush, 2002).

The other dimension of impulsive behavior is impulsive decision-making. Delay discounting falls into this category and reflects the manner in which an outcome loses its ability to alter behavior because it is postponed (Rachlin, 2000). For example, if an individual is attempting to get in good physical shape, the ultimate value for fitness may be discounted because of the length of time it will take to reach the goal. With most laboratory measures of delay discounting, the comparative worth of immediate rewards against delayed rewards are measured with choice procedures (e.g. Richards, Zhang, Mitchell, & de Wit, 1999). More choices for an immediate, but smaller amount of money at the expense of the more valuable, but delayed amount of money is considered more impulsive.

Considerable delay discounting research has focused on adult populations, especially adults with substance dependencies (Reynolds, 2006). Vuchinich and Simpson (1998) found that heavy drinkers discount more by delay than light drinkers, which may imply a direct relationship between this type of impulsivity and amount of alcohol consumed. In another study, self-reports of impulsivity were rated as higher for participants who were formerly drug-dependent than for participants who had no drug use

history; and this finding was confirmed with a delay discounting task (Allen, Moeller, Rhoades, & Cherek, 1998). A study by Petry (2001) examined the relationships among delay discounting, pathological gambling, and substance use disorders and found that pathological gamblers were more impulsive than non-gamblers. Also pathological gamblers with substance use disorders were more impulsive than gamblers without substance use disorders. This finding implies a possible additive interaction for these different conditions as related to impulsivity. Petry also reported a similar study in 2002 that examined the associations among delay discounting, substance use, and antisocial personality disorders (ASP). This research found that substance abusers were more impulsive than non-abusers and that substance abusers with ASP were more impulsive than substance abusers without ASP. As already mentioned, one of the hallmarks of ASP is psychopathic characteristics. The interaction between ASP and substance abuse as related to impulsivity may again signify an additive relationship. However, there has not been any research to replicate these findings among adolescents high in characteristics of psychopathy, more specifically.

Psychopathy

Psychopathy is also a multi-faceted construct (Poythress, Dembo, Wareham, & Greenbaum, 2006) that is often measured through the use of self-report questionnaires (Farrington, 2005). Traits considered psychopathic include remorselessness, lying, lack of empathy, impulsiveness, and thrill-seeking; however, individuals may rate highly on only some of these characteristics. For example, a person may be rated highly on a measure of lying but be comparatively low on thrill-seeking behavior. However, the

individuals who are considered to exhibit the most psychopathy tend to rate highly on all or a majority of the psychopathic traits (Skeem & Cauffman, 2003).

There has not been much research linking psychopathy and addiction (Smith & Newman, 1990). However, a few studies do indicate that psychopathic populations, in general, have higher rates of substance abuse than do non-psychopathic populations (e.g. Smith & Newman, 1990; Hart & Hare, 1989). A study by Reardon, Lang, and Patrick (2002) examined the relationship of psychopathic traits and alcohol problems and found that individuals who rated highest in psychopathy were more likely to have alcohol problems when compared against individuals with low ratings of psychopathy. Another study by Smith and Newman (1990) found that criminal offenders with high psychopathy ratings were more likely to meet *DSM-III* criteria for having drug-use disorders than were criminal offenders with low ratings of psychopathy.

Recent investigations also have linked psychopathy with increased recidivism as well as treatment failures in forensic samples of adults (Poythress et al, 2006). In a study by Hart, Kropp, and Hare (1988) it was found that males who rated high on psychopathic traits were more likely to be rearrested one year after being paroled than male parolees who did not rate highly on psychopathic traits. Hare, Clark, Grann, and Thorton (2000) found that inmates with high psychopathy ratings often do not respond well to interventions and treatments of criminal behaviors.

Findings in adults have influenced research with adolescent populations. Research has shown that many teens participate in some antisocial conduct but that these behaviors usually cease in late-adolescence (Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007). However, a small subset of teens continue offending into adulthood (Skeem &

Cauffman, 2003). Psychopathy in adolescent populations has not received the same amount of attention as in adults (Salekin, Ziegler, Larrea, Anthony, & Bennett, 2003).

Current measures of psychopathy serve to best distinguish adolescents who will desist their antisocial conduct and those who will maintain their conduct into adulthood (Poythress et al, 2006). If an individual can be identified early in life as exhibiting escalating psychopathic characteristics, steps can be developed to rehabilitate that individual before he or she reaches the point of persistent and possibly irreversible psychopathic conduct. For example, Hart and Hare (1997) found that adult criminal offenders who rate high in characteristics of psychopathy began to commit crimes at earlier ages than those offenders who did not rate as highly. Of further interest may be the notion that high ratings of psychopathy usually predict for poor treatment results (e.g. Hare et al, 2000). Perhaps identifying an individual as highly psychopathic may allow for the "tailoring" of a treatment regimen that best serves to rehabilitate that specific individual (Petry, 2002).

This study was designed to consider the relationships between characteristics of psychopathy and impulsivity in adolescent smokers and nonsmokers. The study is an extension to adolescents of similar research in adults (Petry, 2002). Impulsivity was examined using two laboratory-behavioral procedures (behavioral disinhibition and delay discounting) and a self report questionnaire. It was hypothesized that the additive associations that Petry (2002) found between substance use and ASP in adults will replicate with adolescents. As such, there was expected to be additive effects of smoking status and psychopathy characteristics rating for impulsivity.

Method

Participants

Forty-five adolescents (approximately equal numbers of males and females) ranging between 13 and 17 years of age were recruited from a database maintained at Nationwide Children's Hospital. These individuals had at some point in the past participated in research at Children's Hospital and expressed interest in taking part in future projects. The participants were recruited on the basis of smoking status: nonsmokers (n = 15) (those who did not smoke cigarettes at all) and smokers (n = 30) (those smoking five to ten cigarettes per day). Smokers and nonsmokers were matched according to criteria such as race, sex, and median household income. Median household income was based on 2007 U.S. Census Tract data for Columbus, Ohio (U.S. Census Bureau, 2000).

Dependent Measures

Question-based delay-discounting measure(DDQ; Richards et al, 1999). For this laboratory-behavioral task, subjects are given choices between $10 available after a delay (i.e., 1, 2, 30, 180, or 365 days) and a smaller amount which is immediately available (e.g., "Would you rather receive $10 in 180 days or $1 now?"). This measure follows an adjusting amount procedure (the immediate value adjusts in increments of ± $0.50) to determine an indifference point for each delay. An indifference point is the monetary amount in which the delayed standard is equally likely to be chosen as an immediate choice that is of lesser value. For example, a participant may reach an indifference point at receiving $.50 immediately versus $10 in 365 days. Choice questions are presented in a

random order. Subjects are told that their responses to the questions are important because at the conclusion of the DDQ session one question would be randomly selected, and the participant would receive the delayed or immediate money that was chosen.

Go-Stop task (Dougherty et al, 2003). This task is constructed to measure the ability to inhibit predominant, motor responses to visual stimuli. Subjects are shown a series of three-digit black numbers on a light grey computer screen (e.g., 740 . . . 614 . . . 614 . . . 304) with a one second blank screen separating each three-digit number. Two-hundred and forty of these trials were completed in two sessions of 120. Instructions were given to the participants to respond as quickly as possible by clicking the left mouse button when a matching three-digit number appeared (the go signal). The go signal was presented in 50% of the numbers. Subjects earned $0.05 for each go-signal response that happened during the 400ms while the three-digit number was visible. Five cents was lost for each late go-signal response that happened after the three-digit number disappeared from the screen (after 400 ms). The participant was penalized $0.10 for each click (response) to a non-matching number regardless of the latent period. A participant's data were considered to be invalid for the task if 40% or more of the go-signal responses occurred late. This was taken to mean that the participant was not adequately responding to the go signal and in these instances, the data were removed from later analyses.

In 25% of the go-signal trials, the following matching number would change from black to red. This indicated a stop trial, and occurred randomly. Participants were told to withhold a left-click response when the three-digit number changed colors (the stop signal). Participants earned $0.05 for effectively withholding a click after the three-digit number changed colors. Five cents was lost for clicking at an improper time (i.e., clicking

after the matching number changed colors or clicking when the numbers did not match at all) . These color changes would occur at random times within the 400 ms of a go signal. The stop-signal intervals would vary as a function of performance, that is, becoming shorter following failures to inhibit a response and becoming longer following successfully stopping a response. Stop-signal time spans continue to regulate according to these rules until the subject is able to withhold the click response on approximately half of the stop-signal trials. At this 50% standard, the stop reaction time (RT) is analyzed by subtracting the stop-signal delay (when withholding a response is at 50%) from the go-signal RT (the average interval for a subject to click to go-signals). From this analysis, longer stop RTs reflect more behavioral disinhibition and therefore, more impulsivity. Both go RTs and stop RTs are measured in milliseconds.

Barratt Impulsiveness Scale 11 (Adolescent Version) (BIS-11-A; Fossati et al., 2002). The BIS-11-A is a 30-item self-report questionnaire modified from an adult version (BIS-11) for use with adolescents (see Patton, Stanford, & Barratt, 1995). Analyses with the BIS-11-A present six first-order factors, which are as follows: Motor Impulsiveness, Cognitive Complexity, Self-Control, Lack of Delay, Attention, and Perseverance. Nevertheless, intercorrelations among these factors for teenagers are significantly higher than for factors of the BIS-11 for adults (Fossati et al., 2002). Accordingly, the BIS-11-A total score may be the best indicator of impulsivity for research with adolescents. Higher scores on the BIS-11-A indicate greater impulsivity.

Youth Psychopathic Traits Inventory (YPI; Andershed, Kerr, Stattin, Levander, 2002). The YPI is a newly constructed self-report of psychopathy in adolescents. It consists of 50 items that measures psychopathic traits on a 4-point Likert-type scale (1

does not apply at all, 2 *does not apply well*, 3 *applies fairly well*, 4 *applies very well*).The 50 items are equally distributed among ten sublevels that plot onto three domains: Grandiose-Manipulative (dishonest charm, grandiosity, lying, manipulation), Callous-Unemotional (callousness, unemotionality, remorselessness), and Impulsive-Irresponsible (impulsivity, thrill-seeking, irresponsibility). An index score is taken from all domains to indicate the level of psychopathy, with higher YPI scores corresponding to greater characteristics of psychopathy.

Procedure

Before participating in the research, an informed consent was completed by a parent or legal guardian, and assent was obtained from the adolescent upon arrival at Children's Hospital. All research was performed from 12:00 to 20:00 hours. Parents/guardians remained in a waiting room while breath and urine samples were collected from the participants for measurement of carbon monoxide (CO) and cotinine (a metabolite of nicotine) levels, respectively. Both the breath and urine samples allow for current smoking status to be determined. The breath sample was taken using a Micro 4 Smokerlyzer (Bedfont Scientific, Kent, United Kingdon). Self-reported smokers were required to have a CO level of ≥ 9 ppm, and self-reported nonsmokers were required to have a CO level of ≤ 5 ppm. From the cotinine analyses smokers were required to have quantitative cotinine values ≥ 200 ng/ml. Nonsmokers had to have cotinine values of ≤ 50 ng/ml. The urine sample was collected in a private restroom in a heat-sensitive cup to determine the temperature of the samples immediately after being obtained.

Participants first completed an assessment of verbal and nonverbal ability

assessment using the Kaufman Brief Intelligence Test: Second Edition (2nd edition) (Kaufman & Kaufman, 2004). Next, self report measures were completed, and then participants received a five minute rest break. Laboratory-behavioral measures were then completed. Task order was counterbalanced across all participants. Upon completion of all measures, participants were paid for their participation. Participant payment was partially calculated from performance on laboratory-behavioral tasks.

Data Analyses

Participants were divided into three groups for comparison: (a) nonsmokers (n=15), who we expect to have low psychopathy ratings; (b) smokers, with low psychopathy ratings (n=15); and (c) smokers, with comparatively high psychopathy ratings (n=15). The smokers were divided into the low and high psychopathy groupings using a median split on psychopathy ratings. This allowed for the means of all three groups to be compared.

An area-under-the-curve (AUC) method, described by Myerson, Green, and Warusawitharana (2001), was utilized to analyze data for the DDQ. Values of AUC are determined by graphing the indifference points from the participant's responses on the DDQ and calculating the area under the discounting curve. Using this method, smaller AUC values indicate greater discounting and impulsivity; and, conversely, larger AUC values indicate less discounting and less impulsivity.

Demographic data from smokers and nonsmokers were compared across groups with two-sample *t*-tests. However, categorical demographic variables such as race or gender were compared using Chi-squared testing. The data from delay discounting measures are not normally distributed and therefore nonparametric statistical techniques were used to analyze these data. Kruskal-Wallis *H*-tests were used to examine the results across the three groups. Significant effects were further analyzed by Man-Whitney *U*-tests. Spearman's correlation tests were performed on the various measures of impulsivity and psychopathy.

All comparisons that did not involve delay discounting were made using separate one-way analyses of variance (ANOVAs). These analyses utilized participant smoking/psychopathy status as the grouping variables.

Results

Participant Demographics

Participants self-reported demographic and drug use data are presented in Table 1. The smokers had significantly higher CO and cotinine levels than did nonsmokers, thus providing verification of smoking-status classifications. Smokers and nonsmokers also significantly differed in use of alcohol and marijuana. There were no significant differences between the groups' use of caffeine. Smokers and nonsmokers' KBIT scores were also significantly different which provide an estimate of IQ.

Table 1

Participant Demographics and Drug Use Summaries

	Smokers		Nonsmokers	
Variable	M	SD	M	SD
Gender (n)				
Male	11		7	
Female	19		8	
Race (n)				
White	16		7	
Black	10		7	
Other	4		1	
Annual Household Income (*Mdn*)[a]	$56439	$25630	$65819	$29831
Age	15.9	0.80	15.06	1.099
KBIT (Std Score)	100	12.8	87.4	13.4**
Carbon Monoxide (ppm)	10.3	6.9	2.13	1.35***
Cotinine (ng/ml)	1510	725	31	29.9**
Cigarettes (Number per day)[b]	6.57	4.72	0.00	0.00***
Alcohol[c]	2.08	1.47	0.07	0.63**
Marijuana[c]	2.83	1.97	0.07	0.25***
Caffeine[c]	3.40	1.97	3.07	1.67

Note. $N = 45$. [a] The median household income was calculated based on average income from census tract data of the participant's residence. [b] Cigarettes per day were calculated using a timeline follow back calendar to determine cigarettes smoked each day during the past 30 days [c] Substance use was assessed with the following question: "Thinking about the past 6 months, how often have you used the following substances?": 0 = *never tried*, 1 = *tried it*, 2 = *1-2 times/month*, 3 = *once a week*, 4 = *2-4 times/week*, 5 = *5 or more times a week*.
* $p < .05$ ** $p < .01$ *** $p < .001$.

Smokers were further divided into high and low psychopathy groups, and their respective self-reported demographic and drug use data are contained in Table 2. There were no significant differences between the high and low psychopathy smoking groups' use of any drug.

Table 2

Participant Demographics and Drug Use Summaries for Smokers

	High Psychopathy		Low Psychopathy	
Variable	M	SD	M	SD
Gender (n)				
Male	6		5	
Female	9		10	
Race (n)				
White	8		7	
Black	6		5	
Other	1		3	
Annual Household Income (*Mdn*)[a]	$63084	$25873	$49785	$24423
Age	16	0.75	15.8	0.86
KBIT (Std Score)	89	13.9	85.8	13.3
Carbon Monoxide (ppm)	11.5	6.4	9.1	7.6
Cotinine (ng/ml)	1597	888	1436	582
Cigarettes (Number per day)[b]	7.83	5.15	5.42	4.11
Alcohol [c]	2.33	1.59	1.73	1.33
Marijuana [c]	3.53	1.81	2.13	1.88
Caffeine [c]	3.33	2.09	3.46	1.92

Note. $N = 45$. [a] The median household income was calculated based on average income from census tract data of the participant's residence. [b] Cigarettes per day were calculated using a timeline follow back calendar to determine cigarettes smoked each day during the past 30 days [c] Substance use was assessed with the following question: "Thinking about the past 6 months, how often have you used the following substances?": 0 = *never tried*, 1 = *tried it*, 2 = *1-2 times/month*, 3 = *once a week*, 4 = *2-4 times/week*, 5 = *5 or more times a week*.
* $p < .05$ ** $p < .01$ *** $p < .001$.

Dependent Measures

Psychopathy ratings for smokers and nonsmokers did not differ significantly, [$F(1,44) = 1.58$, $p = .255$, two-tailed test]. However, consistent with the initial hypotheses, there was a trend towards the smokers having higher psychopathy ratings than the nonsmokers ($M = 54.17$, $SD = 22.24$; $M = 46.4$, $SD = 19.2$, respectively) (see Figure 1 below).

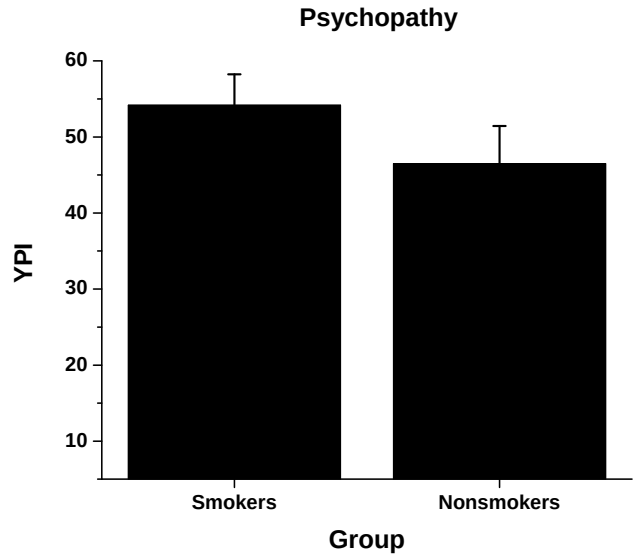


Figure 1:Psychopathy ratings of Smokers and Nonsmokers

Smokers ($M = 69.10$, $SD = 10.16$) and nonsmokers ($M = 68.33$, $SD = 10.45$) also did not significantly differ on the BIS-11-A [$F(1,44) = 0.002$, $p = .814$, two-tailed test] (see Figure 2).

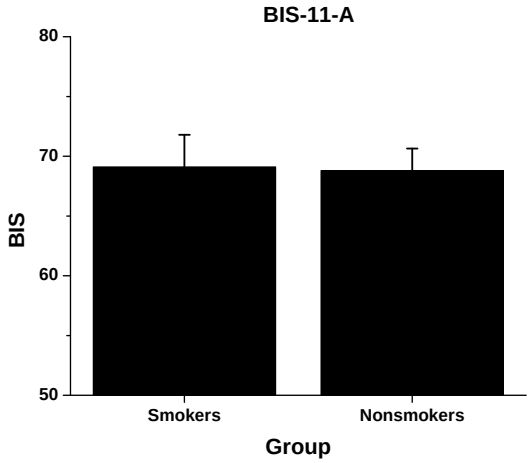


Figure 2: BIS-11-A Ratings of Smokers and Nonsmokers

Data from the Go-Stop Task for six smokers were omitted from analyses due to high percentages of late responses (see Methods section). Smokers and nonsmokers also did not significantly differ on the Go-Stop Task [$F(1,44) = 0.032$, $p = .893$, two-tailed test] (see Figure 3). Smokers ($M = 149.39$, $SD = 51.95$) had a slightly lower average latency value than did nonsmokers ($M = 151.87$, $SD = 58.18$).

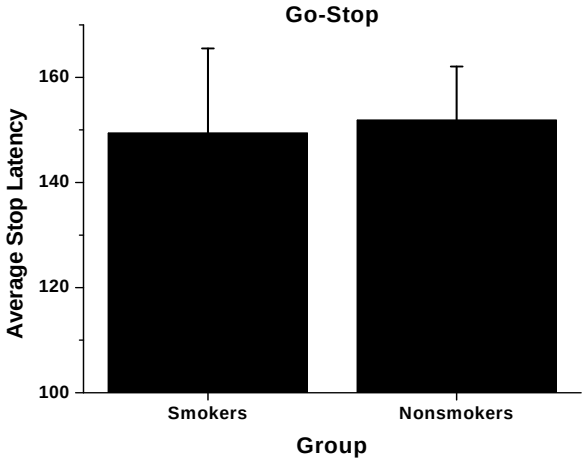


Figure 3: Go-Stop Task with Smokers and Nonsmokers

Smokers and nonsmokers did significantly differ on the DDQ, [$U(44) = 133.0$, $p = 0.027$, two-tailed test] (see Figure 4).

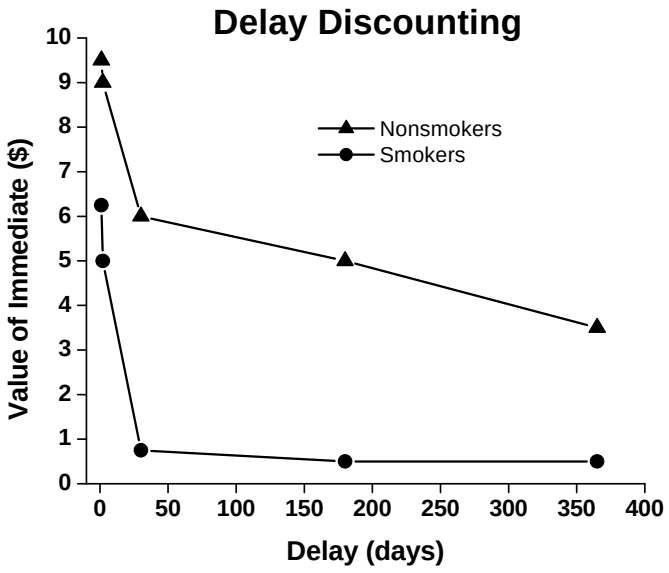


Figure 4: DDQ Indifference Points Between Smokers and Nonsmokers

From Table 1, the standard score measure of the KBIT-2 was also significantly different between smokers and nonsmokers. To test if these IQ differences account for the significant effect of smoking status on delay discounting, a binary logistic regression was performed in which IQ and delay discounting were jointly explored in relation to smoking status. This analysis allowed for exploration of unique or shared variance accounted for in smoking status by these two variables. As such, the effect of IQ remained significant ($p = .035$), while the effect of the DDQ was not found to be significant ($p = .185$). Therefore, it appears that IQ largely accounts for the same variance in smoking status as delay discounting.

As described before, the data from smokers were median split along ratings of psychopathy into a high and low psychopathy groups ($M = 72.87$, $SD = 13.25$; $M = 35.57$,

SD = 9.99, respectively). Again, demographics for these groups are presented in Table 2. Psychopathy ratings were significantly higher for the high psychopathy group than for the low psychopathy group [$F(1,29) = 8.62$, $p = .000$, two-tailed test]. Nonsmokers had higher psychopathy ratings than low psychopathy smokers ($M = 46.40$, $SD = 19.16$; $M = 35.57$, $SD = 35.47$, respectively), but this difference only approached statistical significance [$F(1,29) = 3.00$, $p = .060$, two-tailed test].

Of the dependent measures, the DDQ was the only measure that significantly differentiated the three groups [$H(44) = 9.38$, $p = .009$, two-tailed test] (see Figure 5).

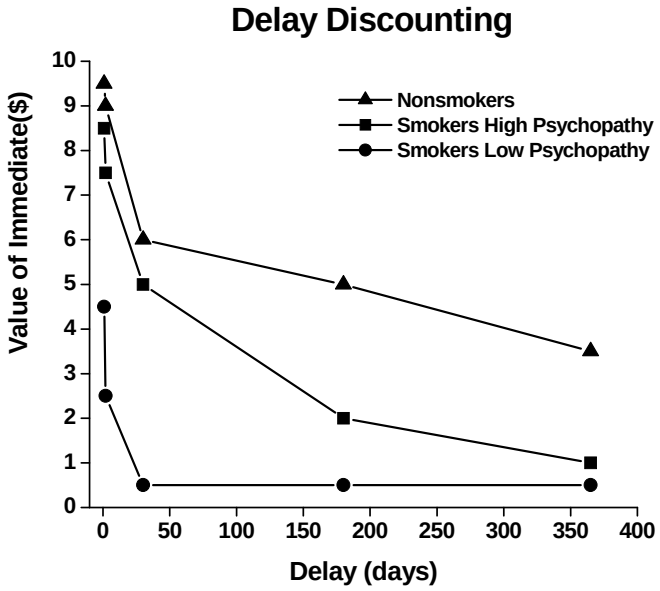


Figure 5: DDQ Indifference Points Among Nonsmokers, Smokers with High Psychopathy and Smokers with Low Psychopathy

High psychopathy smokers and low psychopathy smokers were found to be significantly different on the DDQ, [$U(29) = 61.5$, $p = .034$, two-tailed test]. This difference would not be accounted for by IQ as these groups did not significantly differ in IQ scores (see Table 2). High psychopathy smokers and nonsmokers did not significantly differ on the DDQ, [$U(29) = 91.5$, $p = 0.384$, two-tailed test]. The DDQ did significantly differentiate the low

psychopathy smokers and nonsmokers [$U(29) = 41.5$, $p = 0.003$, two-tailed test]. Still, as with the comparison between smokers and nonsmokers, this difference was reduced to non-significance when variance accounted for by IQ was controlled ($p = .117$).

On the basis that psychopathy carries with it an impulsive component, correlations were performed with the DDQ, total YPI, the three subfactors of the YPI (Grandiosity, Callousness, and Impulsivity), and the BIS-11-A. Correlations involving the DDQ required a Spearman's rho correlation, and all other parametric variables utilized Pearson's correlations. Total YPI score and the DDQ were significantly correlated, [$r_s(44) = -.30$, $p = .046$, two-tailed test]. Among the subfactors of psychopathy, only the correlation between the DDQ with Grandiosity was significant, [$r_s(44) = -.31$, $p = .035$, two-tailed test]. The correlation between DDQ and the subfactor of Callousness was not significant, but this relation approached significance [$r_s(44) = -.28$, $p = .064$, two-tailed test]. The relationship between the DDQ and the Impulsivity subfactor was not significant, [$r_s(44) = -.16$, $p = .28$, two-tailed test]. This is possibly indicative of delay discounting not being the same construct of impulsivity as measured by the Impulsivity subscale of the YPI. The BIS-11-A was not significantly correlated with YPI total scores, thought this relationship approached significance [$r(44) = .287$, $p = .056$, two-tailed test]. However, the BIS-11-A was correlated with the Impulsive subfactor [$r(44) = .54$, $p = .000$, two-tailed test], but not with the other two subscales of Callousness and Grandiosity [$r(44) = .063$, $p = .680$, two-tailed test; $r(44) = .131$, $p = .390$, two-tailed test, respectively]. A low correlation ($r_s(44) = .14$, $p = .724$, two-tailed test) between the BIS-11-A and the DDQ confirms the finding from Reynolds et al

(2006) that self report and laboratory-behavioral measures do not correlate well with one another.

Discussion

This study assessed the relationship between impulsivity and psychopathy in adolescent cigarette smokers and nonsmokers. Several measures of impulsivity were utilized along with a self-report assessment of psychopathy. Smokers were rated slightly higher on the measure of psychopathy than nonsmokers; however, this difference was not significant. The hypothesis that smokers were more impulsive than nonsmokers on the self-report of impulsivity (BIS-11-A) was not confirmed. The measure of behavioral disinhibition (Go-Stop Task) also did not significantly differentiate smokers and nonsmokers. However, the measure of delay discounting (DDQ) did differentiate smokers and nonsmokers. The finding that smokers discount more than nonsmokers is consistent with the finding from Reynolds et al (2007) that smokers and nonsmokers would significantly differ on the DDQ. The same methodological considerations were observed in the current study in that smoking status was ascertained beyond self-reports (i.e., CO and cotinine analysis). However, when IQ differences between the smokers and nonsmokers were controlled, the smoking status difference in delay discounting was no longer significant.

Upon performing a median split on smokers' psychopathy scores, it was found that the DDQ significantly differentiated the low psychopathy group from the high psychopathy group and nonsmokers; but the DDQ did not distinguish between the high psychopathy group and nonsmokers. This finding indicates that the high psychopathy

group discounted similarly to nonsmokers - that being high in characteristics of psychopathy offset the drug-use differences regularly seen in delay discounting.

When the YPI was divided into its component subscales it was found that the DDQ negatively correlated with the subscale related to Grandiosity/Manipulative and approached significance with the subscale of Callousness/Remorselessness. This negative correlation indicates that participants higher in these characteristics of psychopathy discount less by delay and therefore attend more to delayed outcomes. That is, individuals who rate highly in traits of manipulation and callousness are more future-oriented than individuals who do not rate highly in these characteristics. It is often asserted that psychopathy is a "cold and calculating" disorder (Hare, 1993), and this finding with delay discounting may lend evidence to that claim. It is conceivable that an individual who lies to and manipulates others with dishonest charm would need to be more aware of temporal considerations in order to continue the exploitation of a victim over time. If the individual was not skilled in planning and directing his or her behavior toward long-term outcomes, then he or she would likely be exposed as fraudulent.

The correlation between the DDQ and the Impulsive subscale of the YPI was low and not significant. This could indicate that the impulsive component of psychopathy is more related to "general" impulsive behavior and less to delay discounting. The significant correlation between the BIS-11-A and the Impulsive subfactor of the YPI confirms this suggestion.

It was hypothesized that the combination of high ratings of psychopathy and cigarette smoking would yield higher levels of impulsivity than would having low levels of psychopathy and smoking or nonsmoking. This predicted additive relationship would

have paralleled earlier findings from Petry (2002); however, our findings did not confirm this hypothesis. This inconsistency between our findings and those of Petry (2002) may be the result of differences between the constructs of psychopathy and ASP. Parallels between ASP and psychopathy are easily seen in their shared characteristics of deceitfulness (lying), irresponsibility, remorselessness, and general impulsivity; but ASP does not include any diagnostic criteria concerning psychopathy's components related to a lack of emotions (e.g. manipulativeness, dishonest charm, grandiosity).

Therefore, individuals with ASP may lack the future-oriented aptitudes of more exclusively psychopathic individuals. The fact that as many of 75 percent of prison inmates have a diagnosis of ASP (Moran & Mason, 2004), whereas 20 percent have high ratings of psychopathy, possibly indicate that the two constructs reflect two different syndromes (Hare, 1993). In the general population, it is estimated that one to three percent of the population fit the diagnostic criteria for ASP (DSM-IV-TR), whereas four to five percent could be diagnosed with clinical significant levels of psychopathy (Stout, 2006). The fact that ASP (rather than psychopathy) is more prevalent in prison populations and psychopathy is more common (versus ASP) in the general population supports the above notion that there are important differences between these constructs.

A limitation of this study is the small sample size ($n = 45$). As was noted in the results section, several of the effects were not significant, but some did approach significance. It is possible that with a larger sample these effects would be significant. Another limitation is that adolescents were recruited from the general population and not recruited specifically for clinically significant levels of psychopathy. Given the small

sample size, further research to replicate the findings of this study between high ratings of psychopathy and adolescent cigarette-use on delay discounting is needed.

Considering treatment implications for adolescent smoking, treatments oriented toward future, long-term outcomes may be more effective for individuals who rate highly on measures of psychopathy. It may be that people who are high in characteristics of psychopathy stand to better understand the long-term consequences of their actions and thus be more likely to regulate their behavior toward optimal long-term outcomes.

In summary, this study provides evidence that adolescent smokers with high levels of psychopathy discount delayed rewards in a similar way to nonsmokers. That is, rating highly on characteristics of psychopathy appears to negate the frequently observed differences in delay discounting between drug users and nonusers (Reynolds, 2006). It may be that characteristics of psychopathy among adolescents describe a more temporally-aware behavioral style; and as such, a person who is more aware of the future may be more apt to make long-term goals and plans. As such, this study stresses the importance of examining factors associated with variability in delay discounting within drug-use groups.

References

Allen, T.J., Moeller, F.G., Rhoades, H.M., & Cherek, D.R. (1998). Impulsivity and history of drug dependence. *Drug and Alcohol Dependence, 50*, 137-145.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.

Andershed, H., Kerr, M., Statting, H., & Levander, S. (2002). *Psychopathic traits in non-referred youths: A new assessment tool*. In E. Blaauw, & L. Sheridan (Eds.), *Psychopaths: Current International Perspectives* (pp. 131-158). The Hague: Elsevier.

Dougherty, D.M., Mathias, C.W., Marsh, D.M., & Jagar, A.A. (2005). Laboratory behavioral measures of impulsivity. *Behavior Research Methods, 37*, 82-90.

Farrington, D.P. (2005). The importance of child and adolescent psychopathy. *Journal of Abnormal Child Psychology, 33*, 489-497.

Fillmore, M.T., & Rush, C.R. (2002). Impaired inhibitory control of behavior in chronic cocaine users. *Drug and Alcohol Dependence, 66*, 265-273.

Fossati, A., Barratt, E., S., Acquarini, E., & Di Ceglie, A. (2002). Psychometric properties of an adolescent version of the Barratt Impulsiveness Scale-11 for a sample of Italian high school students. *Perceptual Motor Skills, 95*, 621-635.

Hare, R.D. (1993). *Without Conscience*. New York, NY: The Guilford Press.

Hare, R.D., Clark, D., Grann, M., Thornton, D. (2000). Psychopathy and the predictive validity of the PCL-R: An international perspective. *Behavioral Sciences and the Law, 18*, 623-645.

Hart, S.D., & Hare, R.D. (1989). Discriminant validity of the Psychopathy Checklist in a forensic psychiatric population. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1*,211-218.

Hart, S.D., & Hare, R.D. (1997). *Psychopathy: Assessment and association with criminal conduct.* In D.M. Stoff, J. Maser, & J. Brieling (Eds.), *Handbook of Antisocial Behavior* (pp. 22-35). New York: Wiley.

Hart, S.D., Kropp, P.R., & Hare, R.D. (1988). Performance of male psychopaths following conditional release from prison. *Journal of Consulting and Clinical Psychology, 56*, 227-232.

Kaufman, A.S., & Kaufman, N.L. (2004). Kaufman Brief Intelligence Test (2nd ed.). Circle Pines, MN, AGS Publishing.

Logan, G.D. (1994). *On the ability to inhibit thought and action: A user's guide to the stop-signal paradigm*. In D. Dagenbach & T.H. Carr (Eds.), *Inhibitory processes in attention, memory, and language* (pp. 189-239). San Diego, CA: Academic Press.

Loney, B.R., Taylor, J., Butler, M.A., Iacono, W.G. (2007). Adolescent psychopathy features: 6-Year temporal stability and the prediction of externalizing symptoms during the transition to adulthood. *Aggressive Behavior, 33*, 242-252.

Lynam, D.R., Caspi, A., Moffitt, T.E., Loeber, R., & Stouthamer-Loeber, M. (2007). Longitudinal evidence that psychopathy scores in early adolescence predict adult psychopathy. *Journal of Abnormal Psychology, 116*, 155-165.

Moran, T., & Mason, T. (1996). Revisiting the nursing management of the psychopath. *Journal of Psychiatric and Mental Health Nursing, 3*, 189-194.

Myerson, J., Green, L., & Warusawitharana, M. (2001). Area under the curve as a measure of discounting. *Journal of the Experimental Analysis of Behavior, 76*, 235-243.

Patton, J.H., Stanford, M.S, & Barratt, E.S. (1995). Factor structure of the barratt impulsiveness scale. *Journal of Clinical Psychology, 51*, 768-774.

Petry, N.M. (2001). Pathological gamblers, with and without substance use disorders, discount delayed rewards at higher rates. *Journal of Abnormal Psychology, 110*, 482-487.

Petry, N.M. (2002). Discounting of delayed rewards in substance abusers: Relationship to antisocial personality disorder. *Psychopharmacology, 162*, 425-432.

Poythress, N.G, Dembo, R., Wareham, J., Greenbaum, P.E. (2006). Construct validity of the youth psychopathic traits inventory (YPI) and the antisocial process screening device (APSD) with justice-involved adolescents. *Criminal Justice and Behavior, 33*, 26-55.

Rachlin, H. (2000). *The science of self-control*. Cambridge, MA: Harvard University Press.

Reardon, M.L., Lang, A.R., & Patrick, C.J. (2002). An evaluation of relations among antisocial behavior, psychopathic traits, and alcohol problems in incarcerated men. *Alcoholism: Clinical and Experimental Research, 26*, 1188-1197.

Reynolds, B. (2006). A review of delay-discounting research with humans: Relations to drug use and gambling. *Behavioural Pharmacology, 17*, 651-667.

Reynolds, B., Karraker, K., Horn, K., & Richards, J.B. (2003). Delay of probability discounting as related to different stages of adolescent smoking and non-smoking. *Behavioual Processes, 64*, 333-344.

Reynolds, B., Ortengren, A., Richards, J.B., de Wit, H. (2006). Dimensions of impulsive behavior: Personality and behavioral measures. *Personality and Individual Differences, 40*, 305-315.

Reynolds, B., Patak, M., Schroff, P., Penfold, R.B., Melanko, S., & Duhig, A.M. (2007). Laboratory and self-report assessments of impulsive behavior in adolescent daily smokers and nonsmokers. *Experimental and Clinical Psychopharmacology, 15*, 264-271.

Richards, J.B., Zhang, L., Mitchell, S.H., & de Wit, H. (1999). Delay and probability discounting in a model of impulsive behavior: effect of alcohol. *Journal of the Experimental Analysis of Behavior, 71*, 121-143.

Salekim, R.T, Ziegler, T.A., Larrea, M.A., Anthony, V.L., & Bennett, A.D. Predicting dangerousness with two millon adolescent clinical inventory psychopathy scales: The importance of egocentric and callous traits. *Journal of Personality Assessment, 80*, 154-163.

Skeem, J.L., & Cauffman, J.L. (2003). Views of the downward extension: Comparing the youth version of the psychopathy checklist with the youth psychopathic traits inventory. *Behavioral Sciences and the Law, 21*, 737-770.

Smith, S.S., & Newman, J.P. (1990). Alcohol and drug abuse-dependence in psychopathic and nonpsychopathic criminal offenders. *Journal of Abnormal Psychology, 99*, 430-439.

Stout, M. (2006). *The sociopath next door*. New York, NY: Broadway Books.

U.S. Census Bureau. (2000). *Census 2000 datasets: Summary File 3 for Ohio*. Retrieved October 2, 2006, from http://www2.census_2000/datasets/Summary_File_3/Ohio/

Vuchinich, R.E., & Simpson, C.A. (1998). Hyperbolic temporal discounting in social drinkers and problem drinkers. *Experimental and Clinical Psychopharmacology, 6*, 292-305.

Appendix A

CONSENT TO PARTICIPATE IN A CLINICAL RESEARCH STUDY

STUDY TITLE: Correlates of Cigarette Smoking Status in Adolescents

STUDY SPONSOR: Columbus Children's Research Institute

STUDY DOCTOR: **Brady Reynolds, Ph.D.**

CONTACT TELEPHONE NUMBER: 614-722-3549 **(24 hours a day, 7 days a week)**

SUBJECT'S NAME: _____ DATE OF BIRTH: _____

NOTE: The words "you" and "your" are used in this consent form. These words refer to the study volunteer whether a child or an adult.

1) INTRODUCTION

We invite you to be in this research study. Please learn enough about this research study, its risks and benefits, to decide whether you should agree to participate. We must explain the study to you, and give you a chance to ask questions about anything you do not understand. This process is called "informed consent". It is up to you to choose if you want to be in this study. You may refuse to be in this study or quit this study at any time, and standard medical care will still be available here or at a doctor of your choice without a penalty or loss of benefits to you. It is important to understand that there may not be any benefit from being in this study, but we may learn something that could help others.

Before agreeing to participate, it is important to read and understand the study information in this consent form**.** By signing the consent form, you agree to be in this study. If this study involves a child between 9 and 18 years of age, he/she must also agree to be in the study by signing an Assent form or on the assent line of this form. You will be given a signed and dated copy of the consent and the assent form.

2) WHY ARE WE DOING THIS RESEARCH STUDY?

This study is intended to help us better understand risk factors related to smoking in adolescents. It is expected that we will be able to identify some of the most influential risk factors of smoking cigarettes and use this information to develop better forms of treatment and prevention.

3) WHERE WILL THE STUDY BE DONE AND HOW MANY SUBJECTS WILL TAKE PART?

This study will be done at Children's Hospital. About 75 subjects will take part in this study. All 75 subjects will participate here at Children's Hospital.

4) WHAT WILL HAPPEN DURING THE STUDY AND HOW LONG WILL IT LAST?

The study involves a visit to the Children's Hospital where the adolescent will participate in a 2 to 2.5 hour laboratory session.

Teens will start by giving a urine and breath sample to test for cigarette smoking only. Cigarette-smoking status will be private and will not be shared. Then, teens will complete a learning, thinking, and problem-solving task of 30 minutes. Following this task, teens will take a 5 minute break. After the break teens will spend about 35 minutes completing twelve questionnaires, immediately followed by another 5 minute break. Some of these questionnaires ask questions about teens' attitudes of cigarette smoking. Others ask questions about potentially illegal activities. The session will end after a five computer tasks and two interviews have been completed, which last about 1 hour.

Teens will be reimbursed for this session based on computer-task performance (between $20 and $30 each). These computer tasks offer the opportunity to earn money based on choices made during the tasks. If the adolescent decides to quit the study before completing all of the computer tasks, he or she will get to keep whatever money had been earned to that point, with a minimum of $20. $5 will be allotted for travel expenses.

Session activities (2-2.5 hours):

Teen:

1. Give urine and breath samples (about 5 minutes).
2. Complete learning, thinking and problem-solving tasks (about 30 minutes).
3. Break (about 5 minutes).
4. Complete paper questionnaires (about 35 minutes).
5. Break (about 5 minutes).
6. Complete computer tasks (about 1 hour).
7. Reimbursement.

5) WHAT BAD THINGS CAN POSSIBLY HAPPEN DURING THIS STUDY?

Being in this study involves little risk to the subject. All data will be coded with subject numbers so that the data will be separate from personally identifying information. However, loss of confidentiality is possible but all steps will be taken to avoid loss of confidentiality.

Some of the computer tasks may become boring, but the subject is able to withdraw from the study at anytime during the procedure. The participant can keep whatever money had been earned to the point of quitting the study.

There may be other risks of being in this research study, which are not known at this time.

6) WHAT GOOD THINGS CAN POSSIBLY HAPPEN DURING THIS STUDY?

There may be no benefit from being in this study, but we might learn something that could help others.

7) WHAT HAPPENS IF BEING IN THIS STUDY CAUSES INJURIES?

If being in this study causes an injury, Children's Hospital will provide medical care. You or your insurance company may have to pay for the cost of this care. This does not mean that you give up any of your rights under state or federal laws to ask for this care to be paid by someone else.

8) OTHER IMPORTANT INFORMATION

Being in more than one research study at the same time may cause injury. You should tell the Study Doctor about being in any other research study. The Study Doctor will decide if it is OK to be in more than one study at the same time.

9) WHAT WILL HAPPEN IF I DO NOT FINISH THIS STUDY?

It is your choice to be in this study or to stop at any time. If you decide to stop being in this study, it is OK, but you must call the study doctor or the study coordinator. If you stop being in the study, there will not be a penalty or loss of benefits to which you are otherwise entitled.

10**)** WILL THERE BE ANY COSTS TO ME?

It will not cost you anything to be in this study. Your parking will be paid for while you are in this study.

11) HOW WILL MY STUDY INFORMATION BE KEPT PRIVATE?

Information collected for this study will be kept confidential to the extent allowed by law. Each participant will be assigned a participation identification code. Information used and/or disclosed (shared with someone outside of Children's Hospital) may include information that can identify you. This is called "protected health information" or PHI. By agreeing to be in this study, you are giving permission or authorizing Dr. Brady Reynolds and his study staff to collect, use, and disclose your PHI for this research study. Information collected is the property of Dr. Brady Reynolds. In the event of any publication regarding this study, your child's identity will not be revealed. Employees from the following organizations may receive copies of the study records:

- Dr. Brady Reynolds and his employees
- The Office for Human Research Protections (OHRP)

- The Institutional Review Board (IRB) of Children's Research Institute (a committee that reviews all research)

Because of the need to give information to these people, absolute confidentiality cannot be guaranteed. Information given to these people may no longer be protected by federal privacy rules.

- **Protected Health Information that may be used or disclosed:**

    - Breath – and urine-sample results
    - Self reports of recent drug use
    - All data generated from the questionnaires completed during participation
    - All data generated from the behavioral tasks completed during participation
    - All demographic data (for example, age, sex, race) collected during participation

If you have a bad outcome or adverse event from being in this study, the Study Director and staff or other health care providers may need to look at your entire medical records.

The PHI collected or created under this research study will be used/disclosed as needed until the end of the study. The records of this study will be kept for an indefinite period of time.

You may decide not to authorize the use and disclosure of your PHI, however, if it is required for this study, you will not be able to be in this study. If you agree to be in this study and later decide to withdraw, you may also withdraw your authorization to use your PHI. This request must be made in writing to the Study Director. If you withdraw your authorization, no new PHI may be collected and the PHI already collected may not be used unless it has already been used or is needed to complete the study analysis and reports.

To help us protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. With this Certificate, the researchers cannot be forced to disclose information that may identify you, even by a court subpoena, in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings. The researchers will use the Certificate to resist any demands for information that would identify you, except as explained below.
The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of Federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA).
You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information.

The Certificate of Confidentiality does not prevent the researchers from disclosing voluntarily, without your consent, information that would identify you as a participant in the research project under the following circumstances:

-intent to cause injury to oneself.

Dr. Brady Reynolds keeps a database of all subjects who participate in a research study. This database is used to keep track of the research studies Dr. Reynolds conducts and who participated in each study. This database is also used to contact people about future studies. Only Dr. Reynolds and his staff have access to this database.

Please initial:

____ I want to be contacted about future research studies.

____ I do not want to be contacted about future research studies.

12) <u>WHOM SHOULD I CALL IF I HAVE QUESTIONS OR PROBLEMS</u>?

If you have questions about anything while on this study, you have 24 hour access to talk to your study doctor at 614-722-3549. If you have questions or are worried about your rights as a research volunteer, please call (614) 722-2708, Children's Hospital, Institutional Review Board, (IRB, a committee that reviews all research in humans at Children's Hospital).

Subject's Name _____Date of Birth_____

SUBJECT or SUBJECT'S LEGAL REPRESENTATIVE STATEMENT

I have read this consent form and have had a chance to ask questions about this research study. These questions have been answered to my satisfaction. If I have more questions about participation in this study or a research-related injury, I may contact the Study Doctor. By signing this consent form, I certify that all health information I have given is true and correct to the best of my knowledge.

I agree to participate in this study and to allowing my child to participate in this study. I will be given a copy of this consent form with all the signatures for my own records.

CONSENT SIGNATURES

SUBJECT or SUBJECT'S LEGAL REPRESENTATIVE	DATE SIGNED
SUBJECT or SUBJECT'S LEGAL REPRESENTATIVE	DATE SIGNED
PERSON OBTAINING CONSENT I certify that I have explained the research, it's purposes, and the procedures to the subject or subject's legal representative before requesting their signature.	**DATE SIGNED**
STUDY INVESTIGATOR SIGNED	**DATE**

Assent Form

THE PERSON IN CHARGE OF THIS STUDY: Dr. Brady Reynolds

Other Study Doctors: None

SUBJECT'S NAME: _____ DATE OF BIRTH: _____

We invite you to be in a research study at Children's Hospital. We want you to read and understand some things about being in this research study:

- It's o.k. to say "no" if you don't want to be in the study.
- You are allowed to quit being in the study any time.
- We have to explain the study to you so you can understand it. You can ask questions.

1. WHY ARE WE DOING THIS RESEARCH STUDY?

We are doing this research to help us better understand risk factors related to cigarette smoking status in teens.

2. WHAT WILL HAPPEN DURING THE STUDY?

The study will take place with one visit to Children's Hospital which will take about 2 to 2.5 hours. During this visit you will complete 13 questionnaires, 5 computer tasks, 2 face-to-face interviews, and complete a learning, thinking and problem-solving task. You will also be asked to provide a breath and urine sample. These samples will be used to test for cigarette smoking only**.**

When you arrive, you will start the session by giving a breath and urine sample. Then you will complete a learning, thinking, and problem-solving task that take about 30 minutes to complete. After this you will take a 5 minute break. Then you will spend about 35 minutes completing paper and pencil questionnaires. Some of these questionnaires ask questions about teens' attitudes of cigarette smoking. Others ask questions about potentially illegal activities. When you are finished with these, you will take another 5 minute break. After the break you will complete a group of computer tasks that will take about one hour. These computer tasks will give you the opportunity to earn money based on the choices you make while doing the tasks. You will get to keep the money you get from these tasks.

If you decide to quit the study before finishing the computer tasks, you will get to keep whatever amount of money you had earned up to that point

Participation events for you:

Session activities (2-2.5 hours):

Child:

8. Give urine and breath samples (about 5 minutes).
9. Complete learning, thinking and problem-solving task (about 30 minutes).
10. Break (about 5 minutes).
11. Complete paper questionnaires (about 35 minutes).
12. Break (about 5 minutes).
13. Complete computer tasks (about 1 hour).
14. Reimbursement.

3. WHAT IF YOU DON'T WANT TO BE IN THE STUDY?

You can say "no" to being in the study if you want. You can also drop out of the study anytime

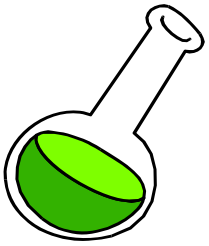
you want.

4. WHAT ELSE DO I NEED TO KNOW?

Sometimes doctors write papers about research studies when they are done. If a paper is written about this research study, your name won't be used in it. We will keep your information private. People who work for Children's Research Institute, the study sponsor, and government agencies will be able to look at your medical information. All information collected during the sessions will be kept private. No information collected will be shared with parents.

There is no cost to you or your parents to be in this study. You will be compensated for the amount of time you spend and any discomforts you may have while participating in this study.

I have read this form. I have had a chance to ask questions about things I don't understand. I want to be in this research study and understand what will happen to me.



_____ _____

Signature of the Subject Date

_____ _____

Signature of the Person Obtaining Assent Date

_____ _____

Signature of the Principal Investigator Date

If you have questions about the study, you can call Dr. Brady Reynolds or a member of the study staff at (614) 722-3549.

Appendix B

Demographic Questions

1. What is your age: _____

2. Sex: Male Female

3. Grade/Level in School: _____

4. Race: Black White Asian Hispanic Native American Other

5. How many siblings (brothers or sisters) do you have: (circle one)

1 2 3 4 5 Other _____

6. If you have siblings, what are their ages: ____ ____ ____ ____ ____ ____

7. What class grade do you typically get: A B C D F (circle one)

8. How many of your friends smoke cigarettes? (Please circle one of the options below)

None Some Half Most All

9. How many of your male friends smoke cigarettes?
(Please circle one of the options below)

None Some Half Most All

10. How many of your female friends smoke cigarettes?
(Please circle one of the options below)

None Some Half Most All

11. How many of your siblings (from question 5) smoke cigarettes: _____

12. Does your mother smoke? (circle YES or NO)

13. Does your father smoke? (circle YES or NO)

14. Do any other caregivers smoke? (circle YES or NO)
If yes, which caregiver? For example stepfather, stepmother: _____

15. Not counting caregivers and siblings, how many members of your extended family (aunts, uncles, grandparents) smoke cigarettes? (Please circle one of the options below)

None Some Half Most All

16. Does your closest or best friend smoke cigarettes? (circle YES or NO)

17. Do you currently use any form of smokeless tobacco? (circle YES or NO)

18. Do you currently smoke cigarettes? (circle YES or NO)

FOR THIS STUDY

19. You will have the potential to earn between $20 and $30 in this study. For you, how important is it that you earn as close to $30 as possible? (Please circle from 1 to 10 below)

Not Important **Extremely Important**

1 2 3 4 5 6 7 8 9 10

ANSWER QUESTIONS 20 THROUGH 23 ONLY IF YOU *SMOKE REGULARLY NOW*

20. For how long have you smoked cigarettes? _____

21. On average, how many cigarettes do you smoke a week? _____

22. When was your last cigarette? _____

a. 1-20 minutes ago
b. 21-30 minutes ago
c. 31-45 minutes ago
d. 46-60 minutes ago
e. more than 60 minutes ago

23. Do you want to quit? _____

Appendix C

BIS-11-A

Directions:

People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement carefully and **CIRCLE THE APPROPRIATE NUMBER** to the right of the statement. Answer quickly and honestly.

		Rarely/ Never	Occasionally	Often	Almost always/ Always
1.	**I plan what I have to do**.	1	2	3	4
2.	**I do things without thinking**.	1	2	3	4
3.	**I make up my mind quickly**.	1	2	3	4
4.	**I am happy-go-lucky**.	1	2	3	4
5.	**I do not "pay attention"**.	1	2	3	4
6.	**My thoughts are racing too fast**. .	1	2	3	4
7.	**I plan my spare time**.	1	2	3	4
8.	**I am self controlled**.	1	2	3	4
9.	**I concentrate easily**.	1	2	3	4
10.	**I am a "saver"**.	1	2	3	4
11.	**I cannot stand still at movies or school**.	1	2	3	4
12.	**I like to think carefully about things**.	1	2	3	4
13.	**I plan for my future**.	1	2	3	4
14.	**I say things without thinking**.	1	2	3	4
15.	**I like to think about complex problems**.	1	2	3	4
16.	**I change my mind about what I will do when I grow up**.	1	2	3	4
17.	**I act "on impulse"**.	1	2	3	4
18.	**I get easily board when solving thought problems**.	1	2	3	4
19.	**I act on the spur of the moment**. . .	1	2	3	4
20.	**I am a great thinker**.	1	2	3	4

		Rarely/ Never	Occasionally	Often	Almost always/ Always
21.	**I change friends**.	1	2	3	4
22.	**I buy things on impulse**.	1	2	3	4
23.	**I can think about one problem at a time**.	1	2	3	4
24.	**I change hobbies and sports**.	1	2	3	4
25.	**I spend more than I should**.	1	2	3	4
26.	**When I think about something, other thoughts pop up in my mind**	1	2	3	4
27.	**I am more interested in the present than in the future**.	1	2	3	4
28.	**I am restless at the movies or lectures**.	1	2	3	4
29.	**I like to play chess or checkers**. . . .	1	2	3	4
30.	**I am future oriented**.	1	2	3	4

Appendix D

YPI

Version 3.0

Instructions

This sheet consists of a number of statements that deal with what you think and feel about different things. Read each statement carefully and decide how well the particular statement applies to you. You can choose between four different alternatives on each statement.

Answer each statement as you most often feel and think, not only how you feel right now.

Example:

I like reading books.

Does not apply at all	Does not apply well	Applies fairly well	Applies very well
☐	☐	☐	☐

- Put a mark in the box that corresponds to how you feel.
- Do not think too long on each statement.

REMEMBER:

- **Answer ALL statements.**
- **Do not put a mark between the alternatives.**
- **Only one answer per statement.**

IMPORTANT!!! There are no answers that are "Right" or "Wrong". You cannot score worse or better than anyone else. We are interested in what you think and feel, not in what is "Right" or "Wrong".

	Does not apply at all	Does not apply well	Applies fairly well	Applies very well
1. I like to be where exciting things happen.	☐	☐	☐	☐
2. I usually feel calm when other people are scared.	☐	☐	☐	☐
3. I prefer to spend my money right away rather than save it.	☐	☐	☐	☐
4. I get bored quickly when there is too little change.	☐	☐	☐	☐
5. I have probably skipped school or work more than most other people.	☐	☐	☐	☐
6. It's easy for me to charm and seduce others to get what I want from them.	☐	☐	☐	☐
7. It's fun to make up stories and try to get people to believe them.	☐	☐	☐	☐
8. I have the ability not to feel guilt and regret about things that I think other people would feel guilty about.	☐	☐	☐	☐
9. I consider myself as a pretty impulsive person.	☐	☐	☐	☐
10. I'm better than everyone on almost everything.	☐	☐	☐	☐
11. I can make people believe almost anything.	☐	☐	☐	☐
12. I think that crying is a sign of weakness, even if no one sees you.	☐	☐	☐	☐
13. If I won a lot of money in the lottery I would quit school or work and just do things that are fun.	☐	☐	☐	☐
14. I have the ability to con people by using my charm and smile.	☐	☐	☐	☐
15. I am good at getting people to believe in me when I make something up.	☐	☐	☐	☐
16. I have often been late to work or classes in school.	☐	☐	☐	☐
17. When other people have problems, it is often their own fault, therefore, one should not help them.	☐	☐	☐	☐
18. It often happens that I talk first and think later.	☐	☐	☐	☐
19. I have talents that go far beyond other people's.	☐	☐	☐	☐

	Does not apply at all	Does not apply well	Applies fairly well	Applies very well
20. It's easy for me to manipulate people.	◻	◻	◻	◻
21. I seldom regret things I do, even if other people feel that they are wrong.	◻	◻	◻	◻
22. I like to do things just for the thrill of it.	◻	◻	◻	◻
23. It's important to me not to hurt other people's feelings.	◻	◻	◻	◻
24. Sometimes I lie for no reason, other than because it's fun.	◻	◻	◻	◻
25. To be nervous and worried is a sign of weakness.	◻	◻	◻	◻
26. If I get the chance to do something fun, I do it no matter what I had been doing before.	◻	◻	◻	◻
27. When someone asks me something, I usually have a quick answer that sounds believable, even if I've just made it up.	◻	◻	◻	◻
28. When someone finds out about something that I've done wrong, I feel more angry than guilty.	◻	◻	◻	◻
29. I get bored quickly by doing the same thing over and over.	◻	◻	◻	◻
30. The world would be a better place if I were in charge.	◻	◻	◻	◻
31. To get people to do what I want, I often find it efficient to con them.	◻	◻	◻	◻
32. It often happens that I do things without thinking ahead.	◻	◻	◻	◻
33. Pretty often I act charming and nice, even with people I don't like, in order to get what I want.	◻	◻	◻	◻
34. It has happened several times that I've borrowed something and then lost it.	◻	◻	◻	◻
35. I often become sad or moved by watching sad things on TV or film.	◻	◻	◻	◻
36. What scares others usually doesn't scare me.	◻	◻	◻	◻

	Does not apply at all	Does not apply well	Applies fairly well	Applies very well
37. I'm more important and valuable than other people.	◻	◻	◻	◻
38. When I need to, I use my smile and my charm to use others.	◻	◻	◻	◻
39. I don't understand how people can be touched enough to cry by looking at things on TV or movie.	◻	◻	◻	◻
40. I often don't/didn't have my school or work assignments done on time.	◻	◻	◻	◻
41. I am destined to become a well-known, important and influential person.	◻	◻	◻	◻
42. I like to do exciting and dangerous things, even if it is forbidden or illegal.	◻	◻	◻	◻
43. Sometimes I find myself lying without any particular reason.	◻	◻	◻	◻
44. To feel guilty and remorseful about things you have done that have hurt other people is a sign of weakness.	◻	◻	◻	◻
45. I don't let my feelings affect me as much as other people's feelings seem to affect them.	◻	◻	◻	◻
46. It has happened that I've taken advantage of (used) someone in order to get what I want.	◻	◻	◻	◻
47. I like to spice up and exaggerate when I tell about something.	◻	◻	◻	◻
48. To feel guilt and regret when you have done something wrong is a waste of time.	◻	◻	◻	◻
49. I usually become sad when I see other people crying or being sad.	◻	◻	◻	◻
50. I've often gotten into trouble because I've lied too much.	◻	◻	◻	◻

Appendix E

Delay discounting questionnaire (DDQ)

[Say]

"You will be choosing between different amounts of money available after different delays. There are no right or wrong answers to these questions… just pick what you prefer. ***But****, the questions you answer are important because one of your answers will be selected at random and you will get what you chose. If you chose delayed money, the money will be put in an envelope with your name and address on it, and it will be mailed to you after the delay. For example, if you chose $10 in 180 days from now, the $10 will be mailed to you after the delay. For example, if you chose $10 in 180 days from now, the $10 will be mailed to you in $180 days.*

In other words….. you're choosing between two options that are presented on the screen. There's no right or wrong answers so pick what you prefer. At the end, one of the questions will be picked and you will get what you chose. So if you chose $10 in 2 days, that money will be mailed to you in 2 days. If you chose $3 now, that money will be added into your total earnings for today."

"Any questions?"

Appendix F

GoStop Task

1. For this task you need to pay attention and remember numbers. This card shows you what the computer screen will look like during your session. Like you see on the card here, the numbers will be black against a white background. The three-digit numbers appear on the screen one right after another.
2. If the numbers match, like this one matches the number you just saw… then you should click the left mouse button, but ONLY when the number you see is exactly the same as the one just before it. Each correct response earns you money.
3. If the numbers do not match, like this one doesn't match the last one, then do not click the left mouse button. If you click a non-matching number you lose money.
4. Ok…. This is the important part. Whenever you respond (by clicking) to a number, you must click while that number is still on the screen. Clicking after the number disappears from the screen does not count and you will lose money.
5. Another tricky part is that sometimes a number that matches the one you just saw will change from black to red. Do NOT click on any number that changes to red. If you click on a number that changes to red, you lose money.
6. During your session you will have a short rest break. The screen will show you a message that tells you how much money you've earned and how much you've lost up to that point. It will also say "Please Rest" …during this time just sit and rest.
7. Just before the end of the break a message will tell you to "get ready." When you see this message, watch the screen for the next part of the session to start. You will do the same thing during all parts of the session…clicking won the matching numbers while they are still on the screen, as long as they don't turn red
8. You will be paid for this session based on how accurately you perform… clicking the mouse when you're supposed to and NOT clicking when you're not supposed to. When the session is over a box will come up again telling you "Please Rest." Shortly after this, another box will pop up telling you how much you've earned and how much you've lost during your session.
9. Do you have any questions?

Appendix G

Timeline Followback Directions

Prior to the interview:

1) *Select the calendars you'll need (if you are doing an interview on December 10 you will need the calendars for November and December).*
2) *The assessment window is 30 days long. It begins the day prior to the appointment date (count this as day 1) and goes back 29 more days (to day 30). Highlight the beginning and ending dates.*

Data collection objectives:

1) *For each day of the 30 day window record the # of cigarettes (including bidis, kreteks, clove cigarettes) per day on the appropriate line.*
2) *Circle a Y (yes) or N (no) for report of quit attempts.*

Interview:

"Now we are going to begin the questionnaire part of the project. I want to remind you that the information that you provide will not be shared with anyone outside of the project's staff. I ask that you be as honest as you can when answering these questions. Ask me any questions you may have as we go through the questionnaires.

"I am going to ask you to recall the number of cigarettes, bidis and flavored cigarettes you have smoked in the last 30 days, starting with yesterday. I just want to get an idea of how many cigarettes you have smoked per day during this time period. This is not a difficult task, especially when you use this calendar and work your way back each day. I realize that it's hard to recall with 100 % accuracy, but just try to be as accurate as possible. When you are unsure, give it your best guess. The important thing is that you provide your best estimate for each day."

TIMELINE FOLLOW BACK
Month _____ , Year _____ **ID# _____**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Day # ___ ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N
Day # ___ ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N	**Day # ___** ___# cigarettes if 0 cigarettes, Quit? Y N

Appendix H

Substance-Use Questionnaire

Thinking about the past *six months*, how often have you used the following substances?

	Never Tried	Tried it	1-2x/ month	Once a week	2-4x/ week	5 or more x/ week
ALCOHOL (Beer /mixed drinks/etc.)	**0**	**1**	**2**	**3**	**4**	**5**
MARIJUANA (Pot/grass/hashish)	**0**	**1**	**2**	**3**	**4**	**5**
CLUB DRUGS (Ecstasy, GHB, Ketamne)	**0**	**1**	**2**	**3**	**4**	**5**
OPIATES (Heroin/morphine/ demorol/codine)	**0**	**1**	**2**	**3**	**4**	**5**
CAFFEINE	**0**	**1**	**2**	**3**	**4**	**5**
BARBITURATES (Downers/sleeping pills)	**0**	**1**	**2**	**3**	**4**	**5**
CIGARETTES	**0**	**1**	**2**	**3**	**4**	**5**
TRANQUILIZERS (Valium, Librium)	**0**	**1**	**2**	**3**	**4**	**5**
COCAINE, CRACK	**0**	**1**	**2**	**3**	**4**	**5**
AMPHETAMINES (Uppers/speed)	**0**	**1**	**2**	**3**	**4**	**5**
CRYSTAL METH (Ice/crystal)	**0**	**1**	**2**	**3**	**4**	**5**
RITALIN	**0**	**1**	**2**	**3**	**4**	**5**
PSYCHEDELICS (LSD/Mescaline/peyote)	**0**	**1**	**2**	**3**	**4**	**5**